

SUBMEPP



MS NO. 5540-081-043 REV B

SUBMARINE MAINTENANCE STANDARD

MR DESCRIPTION: Restore low pressure blower ventilation exhaust gate valve.

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Class: SSN688

SUBMEPP APPROVAL

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SYSTEM/COMPONENT ENGINEER/TECHNICIAN

Scott E. Mercer

4/20/01

PROGRAM MANAGER

DATE



REVISIONS/CHANGES		
REV	DESCRIPTION	SUBMEPP APPROVAL & DATE
-	Original issue was developed to cover, in part, maintenance previously covered by TRS No. 4820-086-038 for SSN688 Class.	B. W. Young Eric E. Blough 11/21/97
A	<p>The MS was revised to:</p> <ol style="list-style-type: none"> 1. Incorporate UACS PNS-00-132 (revised dwg number for SSN688-710 and added ship applicability for SSN711-773). 2. Incorporate SUBMEPP comments (added applicable GAC steps as an attachment). 	T. C. Chan Scott E. Mercer 1/19/01
B	<p>The MS was revised to:</p> <ol style="list-style-type: none"> 1. Incorporate UACS PSNS-01-005 (modified determination of line of contact between stem and bonnet). 2. Incorporate SUBMEPP comments (enhanced MS to support SHAPEC initiatives). 	T. C. Chan Scott E. Mercer 4/20/01
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MAINTENANCE STANDARD

EQUIPMENT/COMPONENT	MS NO. 5540-081-043
Low Pressure Blower Ventilation Exhaust Gate Valve	
SYSTEM	RELATED MAINTENANCE
Low Pressure Blow	None

MR DESCRIPTION

1. Restore low pressure blower ventilation exhaust gate valve.

ATTACHMENTS

1. Globe/Gate/Swing Check Valve Material Condition Feedback (MCF) Requirements
2. Equipment Guide List/Maintenance Requirement Parts List
3. Applicable Steps of General Acceptance Criteria (GAC)

TECHNICAL REFERENCE DATA

- | | |
|---|------------------------------|
| (a) 5" - 150# Gate Valve, Flanged Ends USAS B16.5 | P.J. Hydraulic Drawing E1160 |
| (b) Requirements for Nondestructive Testing Methods | NAVSEA T9074-AS-GIB-010/271 |

NOTE: Additional documentation and detailed part drawings that may be required for corrective maintenance are listed in the Maintenance Requirement Parts List.

SAFETY PRECAUTIONS

1. Observe standard safety precautions.
2. Equip hydrostatic test pump with a certified test gage and relief valve. Set relief valve at 18 psig maximum.
3. Equip hydrostatic test pump with a certified test gage and relief valve. Set relief valve at 16 psig maximum.

BOUNDARIES

1. Boundaries of this MS are the entire valve up to and including the inlet and outlet connections, but not including the attached check valve or system piping.

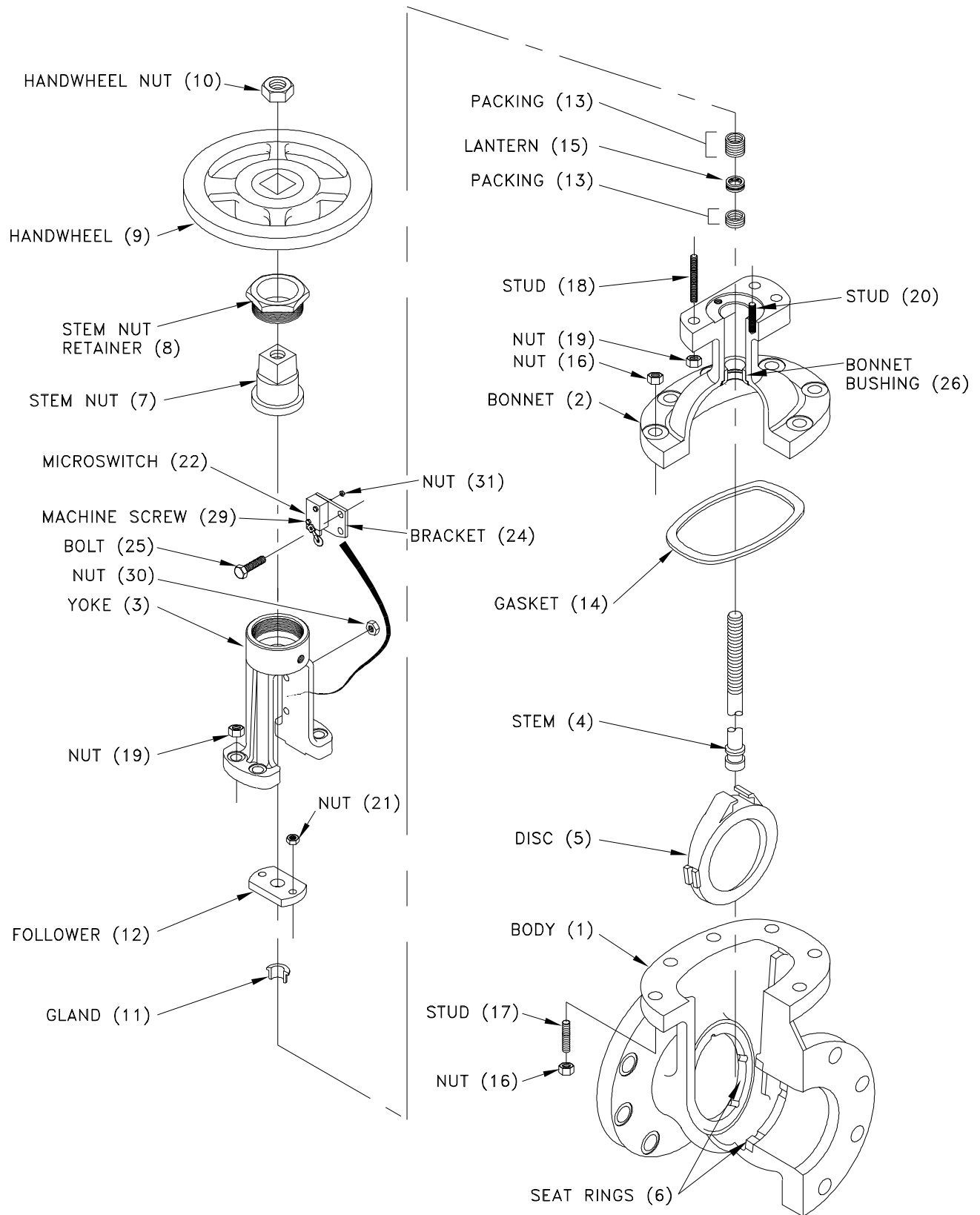


Figure 1. Low Pressure Blower Ventilation Exhaust Gate Valve

PROCEDURE

Preliminary

NOTE 1: In instances where design criteria (e.g., surface finishes, tolerances, etc.) conflict with the criteria of this MS, the criteria of this MS must govern.

- a. Ensure valve has been isolated, depressurized, and tagged out in accordance with Type Commander's instructions.

1. Restore low pressure blower ventilation exhaust gate valve.

NOTE 2: All parts identified as M (mandatory) in the Maintenance Requirement Parts List must be replaced. Other parts that do not meet the acceptance criteria, as defined herein, may be either repaired to original design requirements, in accordance with approved procedures, or replaced, whichever is more economical. A clarification of the above requirement is that metal removal is allowed to bring unacceptable surface defects within the acceptable limits of this MS, provided the metal removal does not cause any dimensional or geometric requirements of this MS (or the original design, where the MS is silent) to be violated.

NOTE 3: Prior to disassembly, refer to Instructions for Globe/Gate/Swing Check Valve Material Condition Feedback (MCF) Requirements in Attachment 1.

- 1.a. Bleed off any residual pressure remaining in valve body and remove valve from system.
- 1.b. Tag valve to identify location and ship's name; deliver valve to restoring activity.
- 1.c. Clean shipboard piping connections to the extent that no foreign material is visible; maintain cleanliness in accordance with UIPI 0505-908.

NOTE 4: Unless otherwise specified, surface finish and the size and spacing of surface defects may be estimated visually.

NOTE 5: Unless otherwise specified, rhr surface finish requirements apply only to surfaces surrounding acceptable defects and not to the defect areas themselves. Sharp or raised edges on acceptable defects are not acceptable.

NOTE 6: Piece numbers are from Attachment 2.

- 1.d. Inspect shipboard piping connections:
 - 1.d.(1) Inspect flange, piece FL-3, and flange on swing check valve ABT-38:
 - 1.d.(1)(a) Visible cracks are not acceptable.
 - 1.d.(1)(b) Flat gasket sealing surface must meet the requirements of Attachment 3 Step 1.c.(2).
 - 1.d.(1)(c) Flange thickness must meet the requirements of Attachment 3 Step 1.b.(4) for a 15/16" nominal flange thickness.

PROCEDURE (Cont'd)

1.d.(2) Inspect bolt, piece B-2, and nut, piece N-2:

1.d.(2)(a) Visible cracks are not acceptable.

1.d.(2)(b) Threads must meet the requirements of Attachment 3 Step 1.e.(2).

1.d.(2)(c) Ineffective wrench flats are not acceptable.

1.e. Cover shipboard piping connections to prevent foreign material from entering system.

1.f. Disassemble valve using Reference (a), Figure 1, and the following instructions as guides:

1.f.(1) Unscrew elastic stop nuts, piece 30, from hex head machine screw, piece 29, attaching microswitch, piece 22, to bracket, piece 24, and remove the switch from the bracket.

1.f.(2) Unscrew handwheel nut, piece 10, and remove handwheel, piece 9, from stem nut, piece 7.

1.f.(3) Unscrew stem nut retainer, piece 8, from the upper portion of yoke, piece 3.

1.f.(4) Remove stem nut, piece 7, from the acme threads of stem, piece 4.

1.f.(5) Unscrew yoke bolt stud nuts, piece 19, from yoke bolt studs, piece 18, and remove yoke, piece 3.

1.f.(6) Unscrew bonnet bolt-stud nuts, piece 16, and lift bonnet, piece 2, together with the stem, piece 4, and disk, piece 5, from body, piece 1.

1.f.(7) Remove bonnet gasket, piece 14, from the body.

1.f.(8) Slide disk, piece 5, off stem, piece 4.

1.f.(9) Unscrew gland follower stud nuts, piece 21, and slide gland follower, piece 12, up the stem. Remove gland, piece 11.

1.f.(10) Pick packing, piece 13, from bonnet, piece 2, and remove lantern ring, piece 15. Eight rings of packing above the lantern ring and 3 rings of packing below the lantern ring are required.

1.f.(11) Remove stem, piece 4, from bonnet, piece 2.

1.g. Clean all parts to the extent that no foreign material is visible; maintain cleanliness in accordance with UIPI 0505-908.

NOTE 7: Line of contact is defined as the area of contact between the sealing faces of the disc, piece 5, and seat ring, piece 6, obtained from blue check impression method inspection performed in accordance with a NAVSEA-approved procedure.

1.h. Determine the line of contact between disc, piece 5, and seat ring, piece 6:

1.h.(1) Line width must not be less than 1/16".

PROCEDURE (Cont'd)

1.h.(2) Line must extend 360 degrees around sealing faces.

1.h.(3) Line must be defect free.

NOTE 8: Line of contact is defined as the area of contact between the sealing faces of the stem, piece 4, and bonnet, piece 2, obtained from blue check impression method inspection performed in accordance with a NAVSEA-approved procedure.

1.i. Determine the line of contact between stem, piece 4, and bonnet, piece 2:

1.i.(1) Backseat line must have a 100 percent unbroken line of contact with uniform width.

1.i.(2) Backseat line must extend 360 degrees around sealing faces.

1.i.(3) Backseat line must be defect free.

1.j. Inspect disc, piece 5:

1.j.(1) Mating machined surfaces must be free of nicks, burrs, and high spots.

1.j.(2) Surfaces mating with seat rings, piece 6, finish must be rhr 32 or smoother.

1.j.(3) Sealing faces surface defects within 1/8" of line of contact, determined in Step 1.h., must not exceed 1/16" in length or width, 3/64" in depth, and defect spacing must not be less than 1/8"; surface defects outside 1/8" of line of contact must not exceed 3/32" in length or width, 1/16" in depth, and defect spacing must not be less than 5/32".

NOTE 9: If metal is removed from sealing faces, an equal amount must be removed from both sealing faces on disc, piece 5, or seat ring, piece 6, as applicable.

1.j.(4) Metal removal from seat surfaces must not exceed 0.032" or allow the disc to bottom out in valve. Seating angle must be $5^{\circ} \pm 6^{\circ}$.

1.j.(5) Surface defects on remaining surfaces must not exceed 0.050" in depth or cover more than 20 percent of the total surface area.

1.k. Inspect gland, piece 11:

1.k.(1) Machined surfaces must be free of nicks, burrs, and high spots.

1.k.(2) Surface in way of packing, piece 13, surface defects must not exceed 0.015" in width, 0.010" in depth, or cover more than 20 percent of the surface area. Metal removal must not exceed 0.005" below minimum dimensions specified in Reference (a).

1.k.(3) Surface finish must be rhr 125 or smoother.

1.l. Inspect body, piece 1:

PROCEDURE (Cont'd)

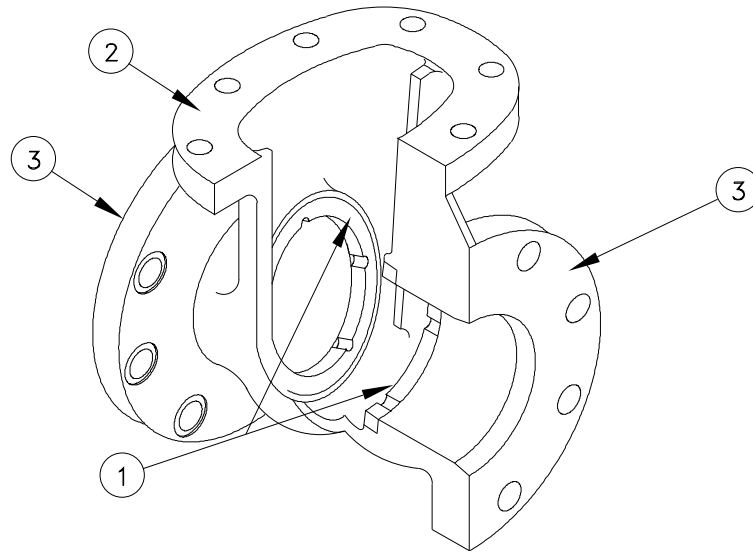


Figure 2. Body

1.1.(1) Visible cracks are not acceptable.

1.1.(2) Mating machined surfaces must be free of nicks, burrs, and high spots.

1.1.(3) Inspect seat ring, piece 6:

1.1.(3)(a) Visually inspect all stellite seating surfaces for defects; minor defects may be repaired by lapping or spotting in the seats and disc until a satisfactory seat to disc line of contact is obtained. For major defects requiring machining, high speed grinding, or weld buildup of stellite surfaces, perform dye penetrant (PT) inspection of the affected surfaces in accordance with Reference (b).

1.1.(3)(b) Sealing faces [1] surface defects within 1/8" of line of contact, determined in Step 1.h., must not exceed 1/16" in length or width, 3/64" in depth, and defect spacing must not be less than 1/8"; surface defects outside 1/8" of line of contact must not exceed 3/32" in length or width, 1/16" in depth, and defect spacing must not be less than 5/32".

NOTE 10: If metal is removed from sealing faces, an equal amount must be removed from both sealing faces of disc, piece 5, or seat ring, piece 6, as applicable.

1.1.(3)(c) Metal removed from backseat surfaces must not exceed 0.032", or allow the disc to bottom out in valve. Seating angle must be $5^{\circ} \pm 6^{\circ}$.

1.1.(3)(d) Surfaces [1] finish must be rhr 32 or smoother.

1.1.(3)(e) Surface defects on remaining surfaces must not exceed 0.050" in depth or cover more than 20 percent of the total surface area.

1.1.(4) Flange flat gasket sealing surface [2] must meet the requirements of Attachment 3 Step 1.c.(2):

PROCEDURE (Cont'd)

1.1.(4)(a) Flange thickness must meet the requirements of Attachment 3 Steps 1.b.(2) and 1.b.(4) for a 1" nominal flange thickness.

1.1.(5) Flange flat gasket sealing surfaces [3] must meet the requirements of Attachment 3 Step 1.c.(2):

1.1.(5)(a) Flange thickness must meet the requirements of Attachment 3 Steps 1.b.(2) and 1.b.(4) for a 15/16" nominal flange thickness.

1.m. Inspect stem, piece 4:

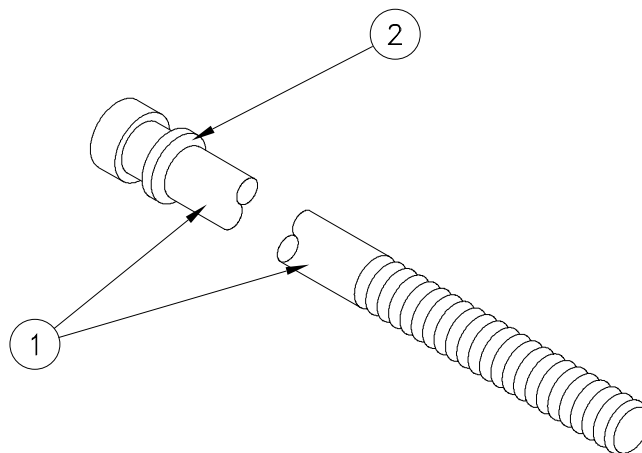


Figure 3. Stem

1.m.(1) Visible cracks or bends are not acceptable.

1.m.(2) Machined surface [1] and backseat surface [2] finish must be rhr 63 or smoother.

1.m.(3) Threads must meet the requirements of Attachment 3 Step 1.e.(2).

1.m.(4) Sealing surface [1], in way of packing, piece 11, surface defects must not exceed 0.010" in width or 0.005" in depth. Defect spacing must not be less than 1/32". Average defect spacing must not be less than 1/8".

1.m.(5) Sealing face [2], surface defects within 1/8" of line of contact, determined in Step 1.i., must not exceed 1/32" in length, width, or depth, and defect spacing must not be less than 1/16"; surface defects outside 1/8" of line of contact must not exceed 3/32" in length or width, 1/16" in depth, and defect spacing must not be less than 5/32".

1.m.(6) Stem must move freely in assembled valve (without packing, piece 13) without sticking or binding, using hand force only; protruding end must reveal little or no runout.

1.m.(7) Diameter [1] must not be less than 0.988".

1.n. Inspect stem nut, piece 7, stem nut retainer, piece 8, and handwheel nut, piece 10:

PROCEDURE (Cont'd)

- 1.n.(1) Mating machined surfaces must be free of nicks, burrs, and high spots; surface finish must be rhr 125 or smoother.
- 1.n.(2) Threads must meet the requirements of Attachment 3 Step 1.e.(2).
- 1.n.(3) Ineffective wrench flats are not acceptable.
- 1.o. Inspect bonnet, piece 2:

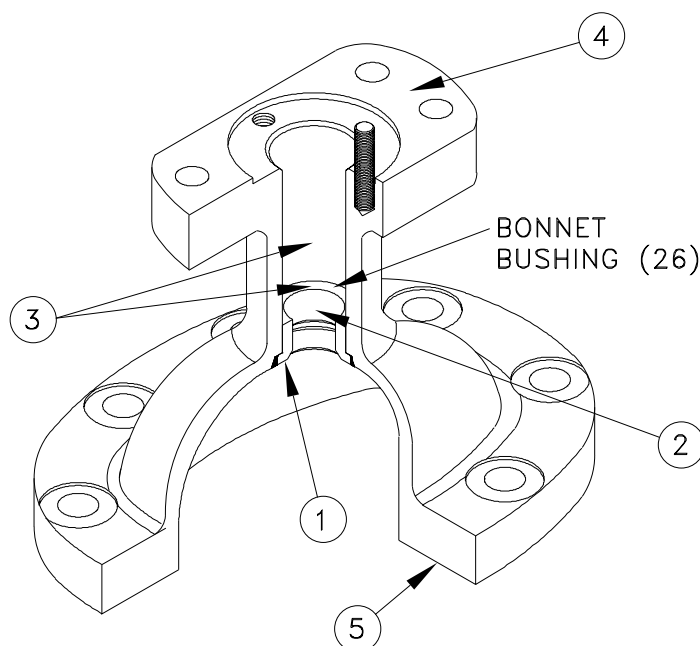


Figure 4. Bonnet

- 1.o.(1) Visible cracks or bends are not acceptable.
- 1.o.(2) Machined surfaces [1] and [2] finish must be rhr 32 or smoother.
- 1.o.(3) Inspect bonnet bushing, piece 26:
 - 1.o.(3)(a) Seating face [1] surface defects within 1/8" of line of contact, determined in Step 1.i., must not exceed 1/32" in length, width, or depth, and defect spacing must not be less than 1/16"; surface defects outside 1/8" of line of contact must not exceed 3/32" in length or width, 1/16" in depth, and defect spacing must not be less than 5/32".
 - 1.o.(3)(b) Metal removal must not exceed 0.032"; backseat angle must be $45^\circ \pm 6^\circ$. Sharp edges on allowable defects are not acceptable.
- 1.o.(4) Sealing surfaces [3], in way of packing, piece 11, surface defects must not exceed 0.015" in width or 0.010" in depth. Defect spacing must not be less than 3/16". Surface finish must be rhr 125 or smoother.

PROCEDURE (Cont'd)

- 1.o.(5) Packing cavity diameter must not exceed 1.52".
- 1.o.(6) Machined surfaces [4] must be free of nicks, burrs, and high spots.
- 1.o.(7) Flange flat gasket sealing surface [5] must meet the requirements of Attachment 3 Step 1.c.(2):
 - 1.o.(7)(a) Flange thickness must meet the requirements of Attachment 3 Steps 1.b.(2) and 1.b.(4) for a 1" nominal flange thickness.
- 1.o.(8) Threads must meet the requirements of Attachment 3 Steps 1.e.(2).
- 1.p. Inspect yoke, piece 3:
 - 1.p.(1) Visible cracks are not acceptable.
 - 1.p.(2) Mating machined surfaces must be free of nicks, burrs, and high spots.
 - 1.p.(3) Threads must meet the requirements of Attachment 3 Step 1.e.(2).
- 1.q. Inspect yoke bolt stud, piece 18; yoke bolt stud nut, piece 19; stud, piece 20; and nuts, piece 21:
 - 1.q.(1) Visible cracks are not acceptable.
 - 1.q.(2) Threads must meet the requirements of Attachment 3 Step 1.e.(2).
 - 1.q.(3) Ineffective wrench flats are not acceptable.
- 1.r. Inspect bonnet bolt stud, piece 17, and bonnet bolt stud nut, piece 16:
 - 1.r.(1) Visible cracks are not acceptable.
 - 1.r.(2) Mating machined surfaces must be free of nicks, burrs, and high spots.
 - 1.r.(3) Threads must meet the requirements of Attachment 3 Step 1.e.(1).
 - 1.r.(4) Ineffective wrench flats are not acceptable.
- 1.s. Reassembly:
 - 1.s.(1) Use M (mandatory) replacement parts identified in the Maintenance Requirement Parts List.
 - 1.s.(2) Verify, using blue check method, 100 percent line of contact between disc, piece 5, and seat rings, piece 6, seating surfaces.
 - 1.s.(3) Reassemble valve using Reference (a), Figure 1, and the following instructions as guides:
 - 1.s.(3)(a) Reinsert stem, piece 4, into bonnet, piece 2.

PROCEDURE (Cont'd)

- 1.s.(3)(b) Reinstall 3 rings of packing, piece 13, the lantern ring, piece 15, and the remaining 8 rings of packing.
- 1.s.(3)(c) Install gland, piece 11, gland follower, piece 12, and gland follower stud nuts, piece 21. Torque nuts, piece 21, to 12 ft-lbs maximum.
- 1.s.(3)(d) Slide disc, piece 5, onto stem, piece 4.
- 1.s.(3)(e) Install bonnet gasket, piece 14, onto the body.
- 1.s.(3)(f) Reinstall bonnet, piece 2, together with the stem, piece 4, and disc, piece 5, into the body. Reinstall bolt-stud nuts, piece 16. Torque nuts, piece 16, to 60 (54 to 66) ft-lbs.
- 1.s.(3)(g) Reinstall yoke, piece 3, and nuts, piece 9, onto studs, piece 18. Torque nuts, piece 19, to 30 (27 to 33) ft-lbs.
- 1.s.(3)(h) Reinstall stem nut, piece 7, onto the acme threads of the stem, piece 4.
- 1.s.(3)(i) Reinstall the stem nut retainer, piece 8, into the upper portion of the yoke, piece 3.
- 1.s.(3)(j) Reinstall handwheel, piece 9, onto stem nut, piece 7, and reinstall handwheel nut, piece 10. Torque nut, piece 10, to 80 (72 to 88) ft-lbs.
- 1.s.(3)(k) Reinstall the microswitch, piece 22, onto the bracket, piece 24, using the elastic stop nuts, piece 30, and the hex head machine screw, piece 29. Torque nuts, piece 30, to 4 (3.6 to 4.4) ft-lbs.

1.t. Hydrostatic test:

NOTE 11: When major repairs (as defined by CINCLANTFLT/CINCPACFLT INST 4790.3, Volume V) have been accomplished, perform Step 1.t.(1). When minor repairs (as defined by CINCLANTFLT/CINCPACFLT INST 4790.3, Volume V) have been accomplished, omit Step 1.t.(1).

1.t.(1) Strength and porosity test (major repair/H-pressure):

WARNING: Equip hydrostatic test pump with a certified test gage and relief valve. Set relief valve at 18 psig maximum.

- 1.t.(1)(a) With valve in half-open position, pressurize valve to 15 (15 to 16) psig using fresh water as a test medium; maintain test pressure for at least 30 minutes plus sufficient time to inspect for leakage.
- 1.t.(1)(b) Inspect for external leakage, weeping through pressure-containing parts, and permanent deformation; external leakage, weeping through pressure-containing parts, or permanent deformation is not acceptable. Observation of water or wetting at fluid boundary at the stem packing does not constitute leakage unless droplets form which flow away from point of origin within 5 minutes of formation.

PROCEDURE (Cont'd)

1.t.(2) Mechanical joint tightness test (minor repair/J-pressure):

WARNING: Equip hydrostatic test pump with a certified test gage and relief valve. Set relief valve at 16 psig maximum.

1.t.(2)(a) With valve in half-open position, pressurize valve to 13 (13 to 14) psig using fresh water as a test medium; maintain test pressure for at least 3 minutes plus sufficient time to inspect for leakage.

1.t.(2)(b) Inspect for external leakage past mechanical joints and seals; external leakage past mechanical joints and seals is not acceptable.

1.t.(3) Seat tightness test:

1.t.(3)(a) Cycle valve.

WARNING: Equip hydrostatic test pump with a certified test gage and relief valve. Set relief valve at 16 psig maximum.

1.t.(3)(b) With valve shut, pressurize valve to 13 (13 to 14) psig using fresh water as a test medium; maintain test pressure for at least 3 minutes plus sufficient time to inspect for leakage. Test to be conducted on both sides.

1.t.(3)(c) Measure seat leakage; seat leakage must not exceed 50 cc/hour.

1.u. Operational test:

1.u.(1) Cycle valve; valve must operate without sticking or binding.

1.u.(2) Valve indication must agree with valve position.

1.v. Deliver valve to ship.

1.w. Reinstall valve in system using M (mandatory) replacement parts identified in the Maintenance Requirement Parts List and the following instructions as guides:

1.w.(1) The flow through a gate valve may be in either direction. Positioning of the valve in the piping system must be in accordance with the applicable arrangement drawing.

1.w.(2) Tighten bolt, piece B-2, and nut, piece N-2, evenly in a normal tightening sequence to allow gasket compression of 20 to 30 percent. To the maximum extent possible, maintain flanges parallel during the tightening sequence.

1.w.(3) Valve lineup is to be accomplished in accordance with the applicable systems manual.

1.x. Ensure tags are cleared in accordance with Type Commander's instructions.

1.y. Post-installation tightness test:

PROCEDURE (Cont'd)

- 1.y.(1) Pressurize valve inlet by conducting a system operational test. Maintain test pressure for at least 30 minutes.
- 1.y.(2) Inspect for external leakage at inlet side mechanical joint; external leakage at inlet side mechanical joint is not acceptable.

Globe/Gate/Swing Check Valve Material Condition Feedback (MCF) Requirements

Instructions

- (1) Observe the general condition of all parts during disassembly for extreme area of wear or deterioration, breakage, or unusual conditions which might affect performance.
- (2) Observations are to be performed prior to scrapping parts (if they are to be replaced) and prior to performing any work or mechanical cleaning which would modify the "as-disassembled" condition.
- (3) Record specific piece/part condition(s) and related failure mechanisms (e.g., bent, cracked, scored, corroded, or eroded, etc.).
- (4) Record in the "Other" section of the Material Condition Feedback Form any unsatisfactory findings that were not specifically inspected for in the Maintenance Standard.
- (5) The Material Condition section of Attachment 1 must be completed, however, to reduce paperwork, you are encouraged to attach copies of work center or shop produced forms and records in lieu of completing the applicable sections of Attachment 1 (e.g., TGI, Mechanical Component Record, Shop Test Record, etc.), provided they meet the requirements of "as-found condition" and/or "corrective action" information.

MATERIAL CONDITION FEEDBACK (MCF) REQUIREMENTS FOR GLOBE/GATE/SWING CHECK VALVES	SEND INFORMATION TO SHIPYARD SMPC (VIA WORK PACKAGING)	OR MAIL TO 	COMMANDING OFFICER SUBMEPP CODE 1810 P.O. BOX 7002 PORTSMOUTH NH 03802-7002		
HULL: _____ AVAIL (SRA, Refit #): _____ COMPONENT: _____ Ser.# (TRIPER/AERP): _____		SWLIN/SSI: _____ SWLIN PARA#/MRN: _____ Job Order (JCN, TGI): _____ FGC/HSC: _____			
COMPONENT CONDITION ASSESSMENT					
Was component in operating condition prior to restoration? ____ Yes ____ No ____ Unknown		If No, please provide reason.			
Inspection Criteria: =====>>	1. Meets MS criteria with no or light handworking required. 2. Machining required to meet MS criteria. 3. Material build-up required (e.g., weld, epoxy coat, electroplating) to meet MS criteria. 4. Part replacement required.				
Inspection Area:	1	2	3	4	Failure Mode Evidence and Comments:
<u>Seat sealing area:</u> body/sealring					
<u>Stem bearing area:</u> body bonnet stem					Is there any evidence of binding (e.g., galling)? ____ Yes (explain) ____ No
<u>Stem sealing area:</u> body bonnet stem					Is there any evidence of leakage past the seal? ____ Yes (explain) ____ No
<u>Disk/Gate:</u> seat sealing area					
<u>Body cavity:</u> wall thickness (when req'd by MS)					
Other: (Supplemental comments on condition or work done to this component, e.g., entire component or unit replaced, changes to mandatory/contingency parts) 					
(Attach additional sheet/information if needed)					_____ Mechanic/Point of Contact
					_____ Date

Equipment Guide List and Maintenance Requirement Parts List

EQUIPMENT GUIDE LIST					
IDENTIFICATION NO.					APL
ABT-013					882047624
MAINTENANCE REQUIREMENT PARTS LIST					
DRAWING NO. P.J. Hydraulics dwg E1160 Rev J					
DESCRIPTION	PIECE NO.	QTY	CAGE	PART NO.	*M/C/S
Packing	13	1 set	80064	803-2177917-05-32	M
Gasket	14	1	17062	B1268	M
Body	1	1	17062	D1208	C
Bonnet	2	1	17062	C1209	C
Yoke	3	1	17062	C1210	C
Stem	4	1	17062	B1215	C
Disc	5	1	17062	D3899	C
Seat ring	6	2	17062	B1217	C
Stem nut	7	1	17062	B1211	C
Stem nut retainer	8	1	17062	A1212	C
Handwheel nut	10	1	17062	A1213	C
Gland	11	1	17062	A1263	C
Bonnet bolt stud nut	16	16	17062	E1160 PC 16	C
Bonnet bolt stud	17	8	17062	A5304	C
Yoke bolt stud	18	4	17062	A5305	C
Yoke bolt stud nut	19	8	17062	E1160 PC 19	C
* Mandatory/Contingency/Special Tool					

MAINTENANCE REQUIREMENT PARTS LIST (Cont'd)					
DRAWING NO. P.J. Hydraulics dwg E1160 Rev J (Cont'd)					
DESCRIPTION	PIECE NO.	QTY	CAGE	PART NO.	*M/C/S
Stud	20	2	17062	A5306	C
Nut	21	2	17062	E1160 PC 21	C
Bonnet bushing	26	1	17062	A1451	C
DRAWING NO. NAVSHIPS dwg 516-4554035 (SSN688-710)					
Gasket	G-2	2	43689	4554035 PC G-2	M
Bolt	B-2	16	43689	4554035 PC B-2	C
Flange	FL-3	2	43689	4554035 PC FL-3	C
Nut	N-2	16	43689	4554035 PC N-2	C
DRAWING NO. NAVSHIPS dwg 516-5007928 (SSN711-773)					
Gasket	G-2	2	43689	5007928 PC G-2	M
Bolt	B-2	16	43689	5007928 PC B-2	C
Flange	FL-3	2	43689	5007928 PC FL-3	C
Nut	N-2	16	43689	5007928 PC N-2	C
* Mandatory/Contingency/Special Tool					

Applicable Steps of General Acceptance Criteria (GAC)

NOTE: This attachment contains only those steps from MS No. 7650-081-001G, General Acceptance Criteria, that are necessary to accomplish the inspections required by this MS.

1. General acceptance criteria

1.b. Flange thickness:

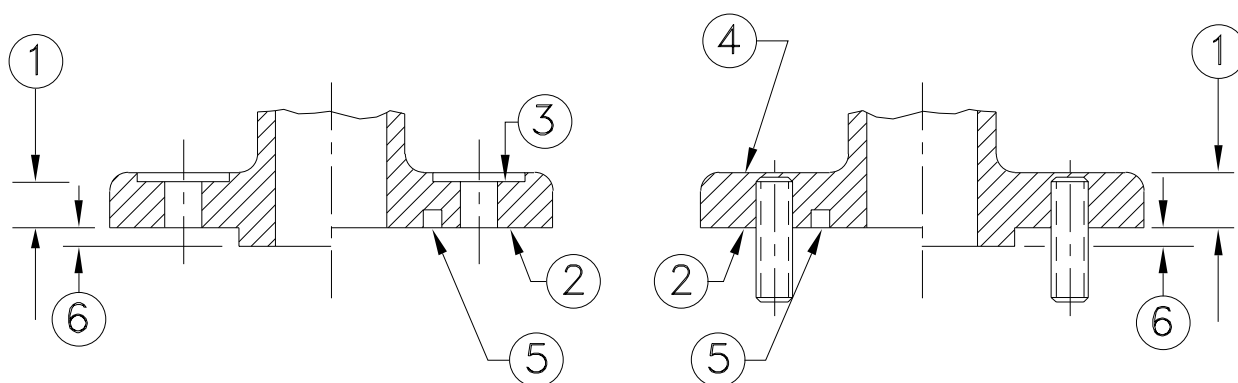


Figure 5. Flange Thickness

- NOTE 11: Flange thickness [1] is defined as the thickness from the finished machined face [2] to the back machined spotface [3], Figure 5 - left, or the thickness from the finished machined face [2] to the as-cast/as-forged back face [4], Figure 5 - right.
- NOTE 12: For non-hull flanges, thickness measurements are not required on flanges where visual inspection verifies no erosion or corrosion.
- NOTE 13: If drawing minimum flange thickness is less than the minimum specified in this section, drawing minimum applies.
- NOTE 14: For non-hull flanges, the minimum average thickness, Table 5 - column C, is determined by averaging 5 spotface thickness measurements, some of which may be below the minimum thickness, Table 5 - column B. If front face [2] to spotface [3] dimension [1], Figure 5 - left, meets or exceeds the minimum thickness, Table 5 - column B, it will be obvious that the minimum average dimensions are acceptable without an arithmetic determination of the average.
- NOTE 15: For flanges with raised faces, refer to Step 1.b.(5).
- NOTE 16: Since reduction of flange thickness may affect fit-up/alignment requirements, an engineering judgement must be obtained before performing Step 1.b.(1)(b) or Step 1.b.(2)(a) unless the equipment or component MS specifically allows the reduction.

1.b.(2) Flat gasket flanges:

- 1.b.(2)(a) Material may be removed from the front face [2] to meet sealing surface requirements of Step 1.c. providing flange thickness [1] is not reduced to less than the value or values specified in Table 5. On flanges where gasket compression is determined by a space remaining after metal-to-metal contact, the gasket space must meet drawing requirements.

NOTE 17: Table 5, columns A, B, and C, identifies hull flange minimum and non-hull flange minimum and average minimum acceptable thicknesses, respectively, for common sizes of flanges. For nominal flange thicknesses not listed in Table 5, the following acceptance criteria apply.

Table 5. Minimum Acceptable Flange Thickness								
Nominal Flange Thickness (Note 11 and Note 15)	Hull Flanges	Non-Hull Flanges			Nominal Flange Thickness (Note 11 and Note 15)	Hull Flanges	Non-Hull Flanges	
	A Minimum (Note 13)	B Minimum (Note 13)	C Min Avg* (Note 14)			A Minimum (Note 13)	B Minimum (Note 13)	C Min Avg* (Note 14)
1/8	0.113	0.113	0.119		1-5/8	1.593	1.503	1.564
1/4	0.235	0.225	0.238		1-11/16	1.656	1.561	1.624
5/16	0.298	0.281	0.297		1-3/4	1.718	1.619	1.684
3/8	0.360	0.338	0.356		1-13/16	1.781	1.677	1.745
7/16	0.423	0.394	0.416		1-7/8	1.844	1.734	1.804
1/2	0.485	0.450	0.475		1-15/16	1.906	1.792	1.865
9/16	0.548	0.506	0.534		2	1.969	1.850	1.925
5/8	0.610	0.563	0.594		2-1/8	2.062	1.975	2.050
11/16	0.673	0.619	0.653		2-3/16	2.125	2.038	2.113
3/4	0.735	0.675	0.713		2-1/4	2.187	2.100	2.175
13/16	0.798	0.731	0.772		2-3/8	2.312	2.225	2.300
7/8	0.860	0.788	0.831		2-1/2	2.437	2.350	2.425
15/16	0.923	0.844	0.891		2-5/8	2.562	2.475	2.550
1	0.985	0.900	0.950		2-3/4	2.687	2.600	2.675
1-1/16	1.031	0.963	1.013		2-7/8	2.812	2.725	2.800
1-1/8	1.093	1.025	1.075		3	2.937	2.850	2.925
1-3/16	1.156	1.088	1.138		3-1/8	3.062	2.969	3.047
1-1/4	1.218	1.150	1.200		3-1/4	3.187	3.088	3.169
1-5/16	1.281	1.213	1.263		3-3/8	3.312	3.206	3.291
1-3/8	1.343	1.272	1.323		3-1/2	3.437	3.325	3.413
1-7/16	1.406	1.330	1.384		3-5/8	3.562	3.444	3.534
1-1/2	1.468	1.388	1.444		3-3/4	3.687	3.563	3.656
1-9/16	1.531	1.445	1.504		4	3.937	3.800	3.900
All dimensions are in inches.								
* A minimum of 5 measurements is necessary to arithmetically determine average thickness.								

- 1.b.(4) Acceptance criteria for flanges other than hull flanges. Minimum and minimum average thicknesses (before and after restoration) must be determined as follows:
- 1.b.(4)(a) Flanges through 1" thick:
- 1.b.(4)(a)1 Minimum thickness must not be less than 90 percent of drawing nominal flange thickness.
- 1.b.(4)(a)2 Average minimum thickness must not be less than 95 percent of drawing nominal flange thickness.
- 1.b.(4)(b) Flanges over 1" through 1-1/3" thick:
- 1.b.(4)(b)1 Minimum thickness must not be less than drawing nominal flange thickness -0.100".
- 1.b.(4)(b)2 Average minimum thickness must not be less than drawing nominal flange thickness -0.050".
- 1.b.(4)(c) Flanges over 1-1/3" through 2" thick:
- 1.b.(4)(c)1 Minimum thickness must not be less than 92.5 percent of drawing nominal flange thickness.
- 1.b.(4)(c)2 Average minimum thickness must not be less than 96.25 percent of drawing nominal flange thickness.
- 1.b.(4)(d) Flanges over 2" through 3" thick:
- 1.b.(4)(d)1 Minimum thickness must not be less than drawing nominal flange thickness -0.150".
- 1.b.(4)(d)2 Average minimum thickness must not be less than drawing nominal flange thickness -0.075".
- 1.b.(4)(e) Flanges over 3" thick:
- 1.b.(4)(e)1 Minimum thickness must not be less than 95 percent of drawing nominal flange thickness.
- 1.b.(4)(e)2 Average minimum thickness must not be less than 97.5 percent of drawing nominal flange thickness.

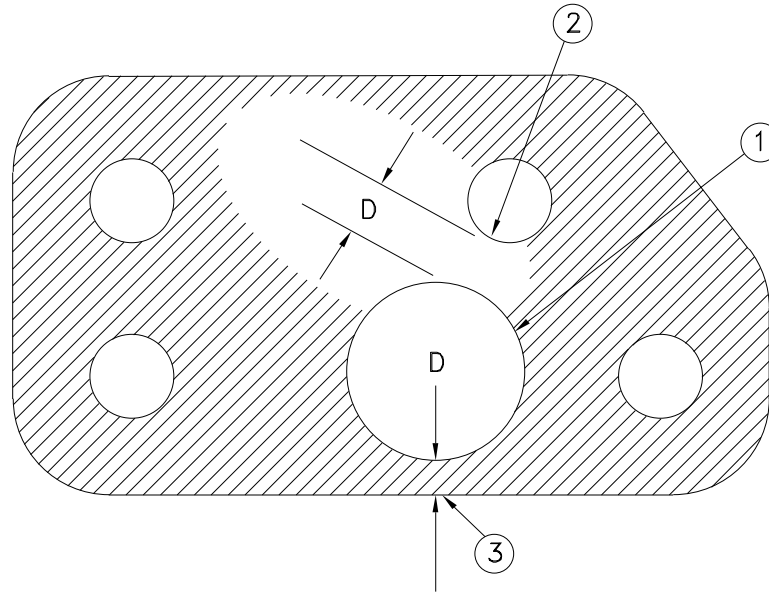
1.c. Flat gasket sealing surfaces:

Figure 6. Flat Gasket Sealing Surfaces

- NOTE 18: D is the distance from inner edge of gasket [1] to inner edge of closest gasket bolt hole [2], or the distance from inner edge of gasket [1] to closest outside edge of gasket [3], whichever is less. For gaskets without bolt holes, D is the distance from inner edge of gasket [1] to closest outside edge of gasket [3].
- NOTE 19: Unless otherwise specified, surface finish and the size and spacing of surface defects may be estimated visually.
- NOTE 20: Unless otherwise specified, rhr surface finish requirements apply only to surfaces surrounding acceptable defects and not to the defect areas themselves. Sharp or raised edges on acceptable defects are not acceptable.
- NOTE 21: Lay is defined as the direction of the predominant surface pattern caused by the machining operation.

1.c.(2) Sealing surfaces machined with concentric or phonographic lay (see Note 18 through Note 21):

- 1.c.(2)(a) Any surface defect or series of surface defects which, if connected, would form a leakage path to any gasket bolt hole [2] or any outer gasket edge [3] is acceptable provided normal gasket contact greater than one half of D exists along that path.
- 1.c.(2)(b) Raised or sharp edges of acceptable surface defects on gasket contact surface are not acceptable.

- 1.c.(2)(c) Gasket contact surface mating with metallic, metal-jacketed, spiral-wound, metal-graphite, and spiral-wound, metal-asbestos gaskets, except for surface defects accepted by Step 1.c.(2)(a), must have a finish of rhr 500 or smoother.
- 1.c.(2)(d) Gasket contact surface mating with flat gaskets, except for surface defects accepted by Step 1.c.(2)(a), must have a finish of rhr 500 to 1000 for concentric cuts and rhr 125 to 250 for phonographic cuts.

TECHNICAL REFERENCE DATA

(a) Submarine Fastening Criteria

NAVSEA S9505-AM-GYD-010

1.e. Threads and self-locking fasteners:

- NOTE 23: Removal of threaded fasteners or thread inserts only to determine acceptability of threads is not required.
- NOTE 24: Reinstallation of studs with anaerobic sealant must be in accordance with recommended vendor procedures or approved local overhaul facility procedures.
- NOTE 25: If necessary, threads should be cleaned before applying these acceptance criteria.
- NOTE 26: Thread requirements apply to the load bearing portions of the fastener only. Defects are acceptable on the free end of the fastener only if they cannot cause damage to the engaging threads.
- NOTE 27: Steam turbine fasteners with original copper plating disturbed need not be replated or replaced, provided anti-galling (compound) lubricant per CID A-A-59004 (Molykote P-37 paste) is used. If replacement fasteners are necessary, they need not be copper plated, provided anti-galling (compound) lubricant per CID A-A-59004 (Molykote P-37 paste) is used.
- NOTE 28: Reference (a) should be used for repair, installation, and replacement of threads and fasteners.

1.e.(1) Type I threads and self-locking fasteners:

- 1.e.(1)(a) Cracks are not acceptable.
- 1.e.(1)(b) Broken, chipped, or missing threads are not acceptable.
- 1.e.(1)(c) Isolated minor defects are allowed. An isolated minor defect is a single nick, gouge, or flattened thread (after removal of sharp edges and raised metal), that has a depth greater than 1/64" but less than 1/2 the thread height (depth) and a width less than the thread spacing (pitch). Defects less than 1/64" may be ignored.

- 1.e.(1)(d) An isolated minor defect that exceeds the width criteria is acceptable when the total length of the defect does not exceed 15 percent of 1 thread length in any 1 complete thread. One complete thread or 1 thread length is defined as 1 complete rotation (360° on a single thread), starting at a point along the thread.
 - 1.e.(1)(e) Any combination of minor defects is acceptable when the total combined length of the defects does not exceed 15 percent of 1 thread length on 1 complete thread.
 - 1.e.(1)(f) Clearance fit threads must engage by hand.
 - 1.e.(1)(g) The locking insert on externally threaded male fasteners must be replaced at each reuse; however, the locking portion may be reused if the element generates a breakaway torque of at least 25 percent of the value listed for the appropriate size in Reference (a) Table 3-4. If logistic problems prohibit compliance with these requirements, threaded male fasteners may be reused by applying an anaerobic thread locking compound chosen to allow future removal (such as MIL-S-22473 Grade C or CVV). Self-locking nuts must meet the requirements of Reference (a) Paragraph 3-41.e(1).
- 1.e.(2) Type II threads and self-locking fasteners:
- 1.e.(2)(a) Thread defects that do not go beyond the thread root diameter are acceptable provided total surface of all engaged threads is not reduced more than 10 percent as estimated visually.
 - 1.e.(2)(b) Clearance fit threads must engage by hand.
 - 1.e.(2)(c) The locking insert on externally threaded male fasteners must be replaced at each reuse; however, the locking portion may be reused if the element generates a breakaway torque of at least 25 percent of the value listed for the appropriate size in Reference (a) Table 3-4. If logistic problems prohibit compliance with these requirements, threaded male fasteners may be reused by applying an anaerobic thread locking compound chosen to allow future removal (such as MIL-S-22473 Grade C or CVV). Self-locking nuts must meet the requirements of Reference (a) Paragraph 3-41.e(1).